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ABSTRACT

Connecticut has proposed legislation to augment the remote education infrastructure which includes public libraries, public schools, and institutions of higher learning. The purpose of one bill is to explore the possibilities of transmitting interactive distance education to all schools intrastate and to classify public libraries at a cheaper government rate for telephone and online computer services. A second bill seeks to establish a joint standing committee to implement a program that would give grants to public libraries in towns where per capita income is below the state average. Connecticut's distance education protocols are being driven by the state's various technological initiatives, such as the I-SNET (Southern New England Telephone Company), a fiber-optic infrastructure for the transmission of voice, video, data, and for interactive television; approximately half of Connecticut's cable operators have functioning remote education protocols. The proposed legislation intends to supply Internet on-ramps in many small Connecticut towns and to effectuate the use of satellite and cable television technology. Pending legislation called the "School Construction Grant Program" seeks to reimburse schools from 40 to 100 percent of technology construction costs, based on the district's wealth. Senior learning, advanced foreign language programs, and cultural awareness can all benefit from interactive distance learning. Most of the state's public schools are not equipped to accommodate new technologies, many computers are archaic, and the majority of teachers have not been adequately trained in the use of educational technology. Opponents of electronic classrooms cite the lack of a human element and high installation and access costs. Tables and figures provide information on Connecticut cable franchise areas; SNET links to learning; cable classroom equipment costs; two-way interactive classroom set-up; and Connecticut's proposed educational technology infrastructure. (Contains 48 notes, all containing references.) (AEF)

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ED 381 134

CONNECTICUT PROPOSES NEW LEGISLATION DESIGNED TO ENHANCE AND INCREASE INTERACTIVE DISTANCE LEARNING FOR TELEPHONE AND CATV TECHNOLOGIES

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Connecticut's General Assembly has proposed, in the recently completed January, 1995, session, legislation intended to augment the already advanced remote education infrastructure. On proposed bill states:

> ....establish(ed) a task force to study the feasibility of bidirectional television service to schools in the state. Such a study includes, but not limited to, investigation into a method of funding the necessary infrastructure.[1]

The overarching purpose of this proposed bill is to explore the possibilities of transmitting interactive distance education to all schools intrastate and would also classify public libraries at a cheaper government rate for telephone and on line computer services, such as America Online, or CompuServe. The second proposed bill augments the first by seeking to establish a joint standing committee to establish a program to give grants to public libraries located in poorer towns, where per capita income is below the state average. The purpose of the pending legislation is to enhance public libraries' access to schools, government, and to supply critical knowledge workers with training and education in telecommunications and in specialized, ancillary information technologies.[2] In the summer of 1993, 34 college and public libraries in the Hartford area switched from traditional card catalogues to CARL-the Colorado Alliance of Research Libraries. As of February, 1995, the National Public Library Association estimates that about 3,600 of 90,000 United States public libraries have converted to a computerized card catalogue format such as CARL, giving rise to the problem of what to with the now archaic card catalogue cases.[3]

The state's regulatory agency, the Department of Public Utility Control, (DPUC or Department) has been at the regulatory vanguard regarding distance learning for the past several years. The Department adopted cable television regulations in 1993 requiring franchise operators to include language in the franchise licensing agreements specifying to what extent and in what manner the operator must:

> ....make available the facilities and equipment necessary to enhance and promote technologically advanced educational programming for advanced educational programming provided by the operator including (1) the provision of educational and instructional channels with bi-directional, full-motion video for the entire franchise community.[4]

1 An Act Concerning A Study of BiDirectional Educational Television, Toll-Free Access to On-Line Computer Services And Rates for Telephone and Computer Services To Libraries. Hartford, CT.: January Session, 1995.

2 An Act Concerning Information Superhighway Grants to Libraries. Hartford, CT: January Session, 1995.

3 Fran Silverman, "Librarians Find New Life for Old Symbol of information Highway," The Hartford Courant, 157, (37), (February 6, 1995): A3, A8.

4 Quality Standards for Instructional and Educational Channels. New Britain, CT: Department of Public Utility Control, Docket No. 92-07-13, May 18, 1993. p. 2.

Connecticut's evolving distance learning protocols are being driven by the state's various technological initiatives, such as the I-SNET, an ambitious $4.5 billion, 15-year, fiber-optic infrastructure for the transmission of voice, video, data, and for interactive television.[5]
The Southern New England Telephone Company, (SNET) builders of the I-SNET, estimates that all its customers will be connected to the I-SNET network by 2009. SNET chose AT&T as the equipment supplier for the interactive, fiber optic network , thus designating the interexchange monolith as the communications gatekeeper of the equipment for the various emerging interactive technologies.

On the cable end, Connecticut has one of the highest cable penetration rates nationally.[6] Of the 26 cable franchise operators in Connecticut, 14 operators have functioning remote education protocols, having a combined total estimated cost of $7,000.000. Five of those 14 operators are now in the process of constructing distance learning systems as a desideratum of franchising renewal. Construction costs range from $35,000 for a three-school protocol to $2,600.00 for a paradigm interconnecting 16 schools.[7]

On the telephone side, SNET has funded, since 1990, through its *Links to Learning /Telecommunications Incentive Grant* (TIG) Program, remote education protocols in over 100 towns and some 84 schools, in addition to providing the technical support. SNET typically supplies technical support staff as a condition of the grant as well as the start-up funding. Grants typically range from $2500 to $5000. A total of $40,000.00 was available directly from the company and its subsidiary, Woodbury Telephone, to fund distance learning programs for the 1994-1995 school year.[8] Grants fund up to 80% of the project's costs; the school itself pays the remaining 20%. Highest consideration is generally reserved for those schools that have not yet participated in the program. Any Connecticut public school is eligible to apply for a TIG, as well as any Regional Educational Service Centers.

The proposed legislation seeks to supply on-ramps in many small Connecticut towns such as the Connecticut River Valley town of Ivoryton, where Internet access can only be effectuated via a long distance telephone call.[9] Informational Access is developed in metropolitan districts, but not in more pastoral areas, because of fewer customers and higher installation costs. In many small communities such as Old Saybrook and the river village of Essex, for instance, the problem is compounded by the restriction in toll-free local calling areas. Whereas

5 Edmund L. Andrews, "AT&T Picked to Build bell Atlantic's Network," The New York Times, 143, (49,702), (May 20, 1994): D1, D14.
6 Bill Keveney, "The Cable Frontier," The Hartford Courant, 156, (171), (June 20, 1994): B1, B3.
7 DPUC Feasibility Study of Provision of Bi-Directional Transmission of Educational and Instructional Programming. New Britain, CT.: Dept. of Public Utility Control, January 28, 1994. pp. 4-5.
8 Ibid., p. 5.
9 SNET Telecommunications Incentive Grant: 1994-1995. New Haven, CT.: Southern New England Telephone Company, February, 1994.

Hartford residents can reach as many 36 surrounding communities toll-free, Old Saybrook residents can reach only four with a toll-free call.

Additional proposed legislation seeks to effectuate the use of satellite and cable television technology. The bill, currently pending before the state's Energy and Public Utility Committee, seeks:

> ....to develop a plan for using satellite and cable television to join students from different types of communities in the state....[10]

Such a scenario is already being played out in a remote educational program between predominately white, rural, Pomfret students, and mostly black, urban, Bridgeport students.[11] Students met several times electronically through an interactive video bridge and personally in December, 1994. According to Pomfret School Superintendent Tim James, "Awareness is probably the biggest thing. It's one thing we thought we could really deal with."

Prior to the drafting of the new legislative proposals, Connecticut lagged far behind many other states in the developing and implementing of technical guidelines for schools to follow. The most difficult aspect of the proposals lies in the actual implementation of the technology into each of the school districts.[12] Pending legislation called the *School Construction Grant Program* seeks to reimburse schools anywhere from 40 to 100% of technology construction costs based upon the district's wealth. Presently, Connecticut schools can be reimbursed from 20 to 80% for technology construction. The legislation calls for up to $50 million to be made available to school districts for either new technology construction or for technological retrofittings. The primary policy problem the proposed legislation seeks to redress is that either the very wealthy or the very poor districts typically tend to get the new technology; middle class districts either do not have the money to afford the technology, or are not affluent enough to fall into the higher reimbursement categories. This new legislation is being proposed by the State Department of Education, and is due out in draft form by the end of the current school year.

Connecticut's emerging remote education protocols are not completely delimited to the state's students. The state's first Senior Net Learning Center opened in January. Formed through a consortium comprised of SNET, Apple Computer, the Groton Senior Center, and the Groton Parks and Recreation Department, SeniorNet is

10 An Act Concerning the Use of Satellite and Cable Television in Connecticut Schools. Hartford, CT.: General Assembly, January Session, 1995. Proposed Bill No. 5566.

11 Susan Campbell, "Video Hookup Helps Kids Reach Out Across Miles," The Hartford Courant, 156, (318), (November 14, 1994): E1, E2.

12 Richard S. Krissinger, Draft Guidelines for Educational Technology. Paper Presented at the CABE/CAPSS Educational Technology Convention, January 5, 1995. 3 pp.

a San Francisco based, non-profit organization of computer literate elderly.[13] Through the telecommunications network called SeniorNet Online, computer users can interact with other elderly across both Connecticut and the country to share interests, hobbies, and concerns. Apple Computer, Inc., donated computers that the seniors will use at the center in Groton. Benefits will include continuing education courses and research information, as well as eventual connectivity to the I-SNET.

Two very successful distance learning programs are based in rural Berlin and urban New Britain, in central Connecticut. Berlin students at the McGee Middle School spend after-school hours at the Berlin-Peck Memorial Library where a new computerized encyclopedia was installed in January. Financial backing was supplied by both the town and by the Friends of the Library.[14] This computerized library is functioning in the town's three elementary schools. The high-tech computerized encyclopedias are much cheaper to update than are conventional books. Costs to revise bound encyclopedias range from $500-700 annually; in CD-Rom the costs are substantively less; between $75-100 to receive annual updated versions of the encyclopedias.

The most recent annual report of the Joint Committee on Educational Technology, (JCET) a standing committee established by state statute to assist the State Board of Education in the efficient use of media technology, delineated support for the pending remote education legislation:

> The state will support a statewide electronic networking system through which all educators and learners will have the ability to access a statewide network of databases and information resources and communicate with other educators and learners.[15]

The JCET has also recommended to the Department of Education that it request over $50 million in state bonding money per year over the next five years to develop the capacity for voice, video, and data communications in every public school classroom in the state. Although no new state funding materialized in the general area of educational technology in 1994, the JCET sent out educational technology recommendations during the summer to the Departments of Education and Higher Education on the matter of expanding educational technology budgets for 1995.

A new and dynamic distance learning protocol was recently activated in the state's south-central region. Called *Knowledge Plus*, the protocol is designed to serve as proving ground for research and development of specifications that can later be used statewide to bring technological innovation directly to bear on schools, public

13 "SeniorNet Learning Center Opens in Groton," (News Release) New Haven: Southern New England Telephone, January 31, 1995.

14 David Polocharin, "Students Eager to Try Computer Encyclopedia," The Hartford Courant, 157, (33,), (February 2, 1995): B3.

15 Joint Committee on Educational Technology: Annual Report and Recommendations of the Joint Committee on Educational Technology. February 1, 1995, 11 pp.

libraries, colleges, universities, and municipalities to raise educational levels and the concomitant standard of living for Connecticut's citizens.[16] Connecticut's public libraries have plunged headlong into the Information Age with the advent of CARL. Information disseminated over the various electronic networks is significantly cheaper than sending paper copies, but the cost of maintaining the toll-free lines in the computer relational database management software costs between $45,000 and $125,000 yearly.[17]

Interactive remote educational protocols have helped to further the cause of otherwise doomed advanced foreign language programs in an era of decreased educational funding. New Britain, a deteriorating mill town in central Connecticut with a high welfare count and a steadily shrinking general tax base, has long had a successful advanced foreign language program at its senior high school.[18] Together with the neighboring communities of Farmington and Plainville, the three districts formed a consortium in conjunction with the local cable franchise operator, a Tele-Communications, Inc., (TCI) affiliate. The classroom uses three cameras; one on the teacher, one on the notepad, and one on the students. The receiving school keeps one camera trained on the students in order that they may be observed by the sending site continuously. Presently, only two of the three high schools can interact concurrently, but the technical capability to allow three-way interaction will become available in the near future. New Britain school officials estimated that approximately $20,000.00 was spent to effectuate the remote learning protocol. Eventual use of fiber optic technology will allow the educational transmissions to be screened from the viewing public.

Up-front technology costs may be partially defrayed through the reception of technology grants. Although the primary cost factor in determining what funding should be allocated to distance education is student-related, e.g., student enrollment, number of full-time students, educational outcomes, etc., there is little extant information on specific funding mechanisms for remote education protocols, largely due to the uniqueness of the individual districts.[19] Connecticut at the present time, does not have legal guidelines for the implementation of educational technology in its schools.

Remote education's inroads in Connecticut have not come easily. Most of the state's standing public schools are structurally antiquated. According to a recent survey, 42% of the public schools are considered crowded, and many computers are archaic. A vast majority of school principals recently interviewed said that only one-fourth or fewer of their teachers have been adequately trained in the proper use of educational technology. Existing wiring in Connecticut's public school's cannot accommodate high-speed, broadband information transmission needed for distance

16 Knowledge Plus Project Proposal. New Haven, CT.: Area Cooperative Educational Services, December 6, 1994.
17 Robert A. Hamilton, "Access Gets New Meaning in Local Politics," The New York Times, 154, (49,998): XIII, 1, 8.
18 Evan Pitkoff and Elizabeth Roosen, "New Technology, New Attitudes Provide Language Instruction," NAASP Bulletin, 78, (563), (September, 1994): 36-43.
19 Tate Ormond and Allan Hiiri, Funding and Spending: What Price Distance Education? Paper Presented at the Ninth Annual Conference of the Distance Education Association of New Zealand, June 18-20, 1993. ERIC ED-362-721.

learning. Few teachers even have adequate access to telephones, and almost none have a voice mail system. During the 1980s, virtually all of Connecticut's public schools acquired at least one computer, but many of these machines are now antiquated.[20] Much of the existing wiring in the state's public schools cannot accommodate the high-speed, broadband information transmissions needed to effectuate full-motion, real-time interactive distance learning. Additionally, since so many of the state's present school facilities are aged, the portentous presence of asbestos in the public school infrastructure hampers the ability of technicians to hard-wire through walls. Less than 12% of American classrooms are currently telephone-wired, and even fewer are wired to accommodate computers because, among other things, the presence of hazardous materials.

Recently, SNET Mobility, the Company's wireless arm, has made possible the MATHLINE remote education protocol at the Irving Robbins Middle School in the affluent, mostly white, suburb of Farmington, and offers a way to effectuate a distance learning program when extant infrastructure problems make hard-wiring an untenable option. Peter Basserman, president of SNET Mobility, stated:

> Teachers and students increasingly need access to electronic information, but antiquated or non-existent wiring in schools makes the necessary phone connections costly and unavailable. Cellular technology is the solution.[21]

Public School students in Hartford recently benefited from new educational technology as the first computer lab installed by Educational Alternatives, Inc., (EAI) a private firm hired last year to run the Hartford public school system, went on-line. The lab, opened in the Clark School, consists of 84 new Dell Desktop computers, and each of the 639 students spends an average of one-half daily at the computer terminal. EAI has promised new classroom computers for each of the city's 32 schools, or about 2,500 but so far, only one other school besides Clark actually has functioning computers.[22] SNET recently sponsored a two-day program that allowed five area high schools to discuss the movie *Schindler's List*. Students participated interactively from their respective classrooms in New Haven, Hamden, Woodbridge, and Chesire High Schools.[23]

The rural town of Berlin has been at the forefront of educational technology in central Connecticut for several years. Two Berlin public schools, McGee Middle, Griswold Elementary, and three other schools were recently electronically interconnected. A TIG of $3,300 helped make the connection possible. The district received the funding at the outset of the 1994 school year. Berlin was one of 20

20 Janet M. Grenzke, Our Children's Schools: Are They Good Enough? A Report of the Survey of Connecticut Public School Principals. Hartford, CT.: Abacus Associates, April 26, 1993. pp. 1-5.
21 Lin Noble, "Middle School Pioneers Wireless Math Link," The New Britain Herald, 300, (December 21, 1994): p. 24.
22 George Judson, "Hartford Schools Enter the New World," The New York Times, 154, (49,995): B6.
23 SNET Sponsors High-Tech Discussion for Students. New Haven, CT.: Southern New England Telephone Company, April 26, 1994.

Connecticut school districts to receive educational programming funding. The allotment will allow: e-mail, distance learning, online news services, and interactive video. The new electronic paradigm augments the district's extant computer network that has been functioning for over four years. The town's high school has had the "Berlin Wall," an electronic bulletin board accessed through a local area network, functioning for several years. The paradigm is currently used by approximately 200 students to perform various types of research projects. Future plans call for the expansion of the bulletin board throughout the district to facilitate informational access from various national databases. Two specific endeavors Berlin school officials are currently contemplating include the writing and exchanging of biographies among students, and the composing of and sharing of personal narratives. Robert Recor, technology instructor at the high school, who recently received national recognition and merit for his innovations in teaching technology stated: "I was trying to incorporate the use of telecommunications so that students could see the value of sending and receiving information."[24]

The emerging trend toward the development of electronic classrooms and learning is not without its opponents and detractors, however. University of Maine professors recently ousted President Michael J. Orenduff over the issue of technology in the classroom. Patrick M. Callan, Executive Director of California's Higher Education
Policy Center stated:

> The question of how technology can substitute for the human element in education is a huge issue, and one over which major battles are going to be fought....What happened in Maine may frighten off other presidents from becoming involved in this. It's one more issue where, if presidents attempt to exert leadership, they may come into conflict with faculties and wind up looking for a job."[25]

The raison d' etre for the uneasiness seems to be that with decreasing budgets and increasing enrollments, some college teachers feel they are in danger of losing control of their classrooms and of he academic environment. As Bill Scheuerman, president of United University Professors stated: "We'll support it {distance learning} if it provides quality of education and doesn't put our positions in jeopardy."[25]

Despite the development of technologies such as Integrated Services Digital Networks, which are predicted to make the transmission of multimedia as cost effective as voice transmission, interactive, full-motion distance education remains pricey. Secondary schools routinely are faced with bills ranging from $110,000 to $150,000 to obtain the electronics that allow connection to the fiber optics, plus additional costs in the $40,000 to $50,000 range in annual access fees paid to local exchange companies for the necessary connections. There is also the additional

24 Sandra James, "Berlin Schools Prepare to Make a Connection," The Hartford Courant 156, (287), (October 14, 1994): B1.
25 William H. Honan, "Professors Battling Television Technology," The New York Times, 154, (April 4, 1995): D24.
26 Ibid., D24.

expense of hiring extra personnel to maintain the new system in proper working order. A new cable operator recently licensed by the Department to begin constructing its system in the Hartford area, *FiberVision*, has committed, as a franchising criterion, to supply return lines to all schools and libraries in the franchise area, but not the actual programming connection.[27] This restriction mirrors SNET's FCC-imposed prohibition on offering educational programming over its existing lines, although the company is allowed to supply the physical wiring for television programming. The fact remains however, that successful, high-quality remote education protocols must be capable of interfacing with extant cable and television systems, which require substantial time and money investments by the involved parties, and broadband "backbone" networks used for supplying consumer video services must be able to be connected to the narrowband local access networks.[28]

Connecticut's cable operators continue to make significant strides in the area of remote education. The DPUC currently regulates approximately 26 cable operators who serve about 1,000,000 subscribers. The operators' estimated annual revenues are $276,000,000.[29] Continental Cablevision, located in the north-central town of Enfield, has had an interactive remote learning system connecting the region's four school districts for several years, enabling an advanced course to be taught from one sending district to the three receiving districts.[30] The system is completely interactive, and uses two channels, so interested subscribers can view both students and teachers simultaneously. Cox Cable, based in the central Connecticut town of Newington, has had a functioning remote learning program up and running for several years. The protocol offers advanced foreign language courses in conjunction with high schools in Glastonbury, South Windsor, Manchester, and to the Manchester Community College, which transmits its own programming. Advanced courses include: Russian, modern Chinese, and Art History. Two franchise operators in the state's most rural area, the northwest corner, Pegasus in Winsted, and a TCI affiliate in Salisbury, recently began offering digital television via satellite. Satellites beam signals to relatively inexpensive pizza-sized receiving dishes. This technology delivers clear images in laser sound. The primary target market for this technology is the rural area, which makes it ideal for distance learning, particularly in the state's northwestern quadrant, where because of hilly terrain and other unique geographical configurations, many homes cannot receive traditional coaxial delivered cable programming, and bandwidth is limited. Says Roberta L. Fusari, Director of Governmental Relations for the New England Cable Television Association, "We are watching that {digital television} with a very serious eye. It will be a very serious competitor to us."[31] The digital satellite system is designed, among other things, to compete directly with traditional cable television systems.

27 Michael Winerip, "Classrooms on the Information Highway," The New York Times, 143, (49,763), (June 20, 1994): B7.
28 Edward S. Szurkowski, "Getting Ready for the Interactive Video Services Revolution: An AT&T perspective," Communications Technology, (May, 1994): 28-32, 92-93.
29 Department of Public Utility Control: Briefing Book. New Britain, CT.: DPUC, December 6, 1994, p. 7.
30 Cable Television in the Information Age. Washington, D. C.: National Cable Television Association, 1992.
31 Rachel Gottlieb, "Digital TV Making Waves in State, " The Hartford Courant. 156, (220), (August 8, 1994): B1, B6.

Since about 1988, TIG funding has enabled towns and Connecticut schools to benefit from the application of telecommunications technology.[32] A grant received last summer by the Connecticut River Valley town of Chester, for example, allowed the town's elementary school to obtain an Internet gateway, which was installed by SNET in September of 1994. The town's goal is to interconnect eventually all five district schools and supply each one with Internet gateway capability. In Newington, second graders at the Ruth L. Chaffee School recently used an on-line computer service to correspond with a nationally known children's writer and poet. To effectuate the correspondence, the school media specialist downloaded messages from the writer as well as an autobiographical file.[33] The Timothy Edwards Middle School in South Windsor used a SNET TIG to set up a distance learning program last year. Some of the applications include: electronic pen pals over the Internet, sister school projects, informal computer "chats" with foreign students, various online activities, foreign languages, etc.[34]

Bulkeley High School in Hartford has been linked to Hall High in West Hartford for several years via a two-way audio and visual connection. The Bulkeley-Hall project is one of 11 cooperative efforts statewide that use communications technology in the curriculum. Course offerings include: foreign languages, astronomy, and philosophy.[35] SNET contributed approximately $140,000 in 1989 in initiate the Bulkeley-Hall protocol using traditional twisted-pair, copper telephone lines. SNET funds the Area Cooperative Educational Services, (ACES) program with a grant of approximately $1.5-million. Each of the five schools involved in the ACES distance learning system contributes about $9,500 yearly to help maintain the system. ACES encompasses the school districts Amity, Chesire, Hamden, North Haven, and New Haven. SNET installed and maintains the fiber-optic link between the North Haven and Hamden High Schools. In September of 1991, a satellite dish was added to the ACES system to supplement professional development of teachers.[36] Located in the south-central section of the state, ACES has approximately 155 students participating in distance learning classes. In north-central Connecticut, coaxial cable links Somers, East Windsor, Granby, and East Granby high schools. Two state grants of about $60,000 over two years funded those protocols. Plymouth, a rural town in the state's west-central corridor, recently had its school board approve a plan to combine resources with other districts within the Waterbury region to improve educational quality and cultural diversity. The Plymouth plan includes linking schools through a single computer network.[37]

Some communications experts believe that Connecticut is on the fast track to the information superhighway, where companies will compete to deliver cable,

32 SNET Links to Learning. New Haven, CT.: Southern New England Telephone Company, October 29, 1994.
33 Michelle Tuccitto, "Computer Links Second Graders. Poet," The New Britain Herald, 44, (February 21, 1995): p. 5.
34 Nina Hansen, Telecommunications Opportunities for Students and Teachers. Paper presented at the CABE/CAPSS Convention on Educational Technology, January 5, 1995.
35 Helen Machado, "Next Best Thing to Being There," The Hartford Courant, 156, (80), (March 21, 1994): A1, A5.
36 ACES Distance Learning Consortium, Manual. New Haven, CT.: Area Cooperative Educational Services, September, 1994.
37 Matthew Brown, "School Diversity Plan Approved," The Hartford Courant, 156, (300), (October 28, 1994): B6.

computer, and electrical services. The DPUC has implemented a series of docketed proceedings, the so-called "Vision Proceedings," covering all and everything from universal telephone service, customer-owned, coin operated services, specialized operator services, etc. Says John F. Merchant, the state's Chief Consumer Advocate:

"Theoretically, is should be good for the consumer if there is more competition and more choices....But nobody can tell you that now. It is a very complex issue. It depends how the implementation of the new legislation all shakes out."[38]

There are also the concerns of those who are skeptical of education's headlong scramble into the technological maelstrom. Yale computer scientist and biblical scholar David Gelernter questions schools' frenetic dive into electronic classrooms replete with interactive video capabilities. He says:

"We are something of an anti-intellectual society. Giving educators computers is like giving booze to an alcoholic. Schools have a tendency to abuse things....to emphasize glitz as opposed to substance."[39]

The governments of the world's seven largest industrialized countries recently met in an attempt to find common ground on the future of the global information network. Among other things, the conference proposed 11 pilot projects as the initial steps in effectuating the information superhighway. Adumbrated projects range from establishing library links and connections to museums and classrooms around the world to constructing links among countries.[40] Connecticut, led by its regulatory agency, remains at the forefront of the unfolding information network. Connecticut schools, particularly its elementary schools, have been the biggest recipients of computers in the last three years. This fact can be confirmed by looking at recent students per computer ratios throughout the state. Plainville's students per computer ratio has improved from 27:1 to 73:1 from 1991-1993. Berlin's computer to student ratio has improved from 14.3 :1 in 1991 to 9.1:1 in 1993. Other ratios include Southington, 18:1 to 15:1, Bristol, 22.6:1 to 19.4:1, and New Britain, 39.2:1 to 22.4:1, all from the years 1991-1993.[41]

As one communications expert has facetiously stated: The Information Superhighway is like a high-speed elephant. Computing companies see one part, telecommunications firms see another, and entertainment companies see still another....the network is made up of many parts....and all the parts must work for it to be successful.[42] The technological revolution has exposed two ideological social strains: one line of thinking grew out of the Great Society and postulates that if the intrusive government that emanated from that ideology is dismantled, then the safe

38 Eve Nagler, "Mapping the Telephone's New Uses," The New York Times, 144, (49, 830), (September 25, 1994): XIII:1, 17.
39 Joel Lang, "Sage of Software," The Hartford Courant Sunday Magazine, (March 20, 1994): 8-14.
40 Nathaniel Cash, "Group of 7 Defines Policies about Telecommunications," The New York Times, (49,985), 154, (February 27, 1995): D1, D3.
41 Margaret Tierney, "Computers Part of Basics at Area Schools, The Hartford Courant, 156, (360): B1, B2.
42 Paul Kirvan, "Get Your License When Driving the Info Superhighway," Communications News, 31, (6), (June, 1994): 50.

streets, strong families, and fiscally responsible, prosperous cities and towns of 1940s and 50s middle-class America can be restored. The other school , the so-called "futurist" crowd says that we should not want things to be as they were, but rather as they could be in a highly technical, specialized, society. What these so-called "tekkies" find so appealing about cyberspace is that it seems to give individuals more power over the monolithic, incontrovertible corporate institutions. William J. Bennet, former Secretary of Education in the Reagan Administration, noted author, and an eminent conservative theoretician has this to say of the futurist crowd: "I've never understood them. I've always regarded it {new technology} as the emperor's new clothes. If futurists are really futurists, why do they bother writing books? Why don't they play the {stock} market?"[43] As a young Pomfret Community High School student stated recently after participating in an interactive videoconference with students at the Roosevelt School in Bridgeport, "I never knew what diversity was until I came here."[44]

Electronic learning will continue to forge new links of cultural awareness in this small but culturally diverse southern New England state. With functioning protocols such as the electronic link between two rural Canton elementary schools and the Simpson Waverly school in Hartford, computers, modems, and telephone wires will continue to transcend the ethnic, racial, cultural, and geographic educational barriers, promote individual and collective awareness, and ultimately enhance the self-actualization capabilities of administrators, teachers, students, and politicians.[45] Rather than eliminate the physical face from the communicative process as remote education's critics contend, the technology allows for the supplantation of physical space with on-lone communications modalities. Students no longer need to have their learning modality restricted to the classroom; the familiar networks of direct human association are thus expanded further into the temporal and spatial lives of individuals.

Connecticut has already fashioned a legislative forum for investigation of the possibilities of supplying educational programming opportunities to all schools in the state, which of course, would aid in the diversification of the schools and the people who comprise them. Financing remains problematic, and presently is in the hands of the municipalities and their local school boards. The interactive age is still in its preliminary phases, but the race is well underway to see who will ultimately deliver the next set of information age services.[46] As the technology evolves and expands, newer interactive services can be offered within the analog system without changing the existing equipment. Wireless cable systems capable of supplying bidirectional traffic can be installed for less than the cost of fiber/coaxial hybrid networks. The beauty of the new technology is that it can be changed as greater bandwidth intensive architecture is installed. Interactive distance education in Connecticut is on the fast

43 David E. Rosenbaum, "Republicans Like Both Previews and Reruns," The New York Times, 4, (December 11, 1994) 14-16.
44 Susan Campbell, "Electronic Pen Pals Meet Face to Face, Compare Concerns," The Hartford Courant, 157, (20), (January 20, 1995): E1, E4.
45 "SNET Grant Brings Education in Town to the Information Highway," The Canton News, (June 9, 1994)
46 George Lawton, "Building the Ubiquinetwork-Part I," Communications Technology, (March, 1994) 25-32.

track to ubiquity, and figures to remain in that mode as the new legislation awaits action by the legislature.

To summarize, Connecticut has three general drivers in the distance education infrastructure: public libraries, public schools, and institutions of higher learning. Each is receiving strong public and political support. Public libraries in particular have been quite active in the computerization of information, such as with the very recent dedicated line from the Wallace Middle School in Farmington to the local public library. As Anne Johnson, Farmington librarian stated: "This {dedicated line} solves the transportation problem for students who are not within walking distance of either the main library or the branch." Although any Farmington resident can use the single line into the library, only Wallace students have access to the school's dedicated line. Johnson says that the Robbins connection is only a beginning. Eventually, all local schools will be library-connected.[47] Although this presentation has concentrated primarily on the distance education protocols functioning within the central Connecticut region, the point is that these individual systems will eventually be interconnected statewide, as the proposed legislation adumbrated earlier and now before the legislature, seeks to effectuate this statewide interconnection. As Matthew Fleury, a TCI spokesman recently articulated: "After all the talk you've heard about the "Information Superhighway," you are actually finally on it {in Connecticut}....This is the most user friendly introduction into the "information highway."[48] The Information Age has indeed arrived in Connecticut, and everybody from elementary school children to the elderly are taking the on-ramps directly to the information freeway.

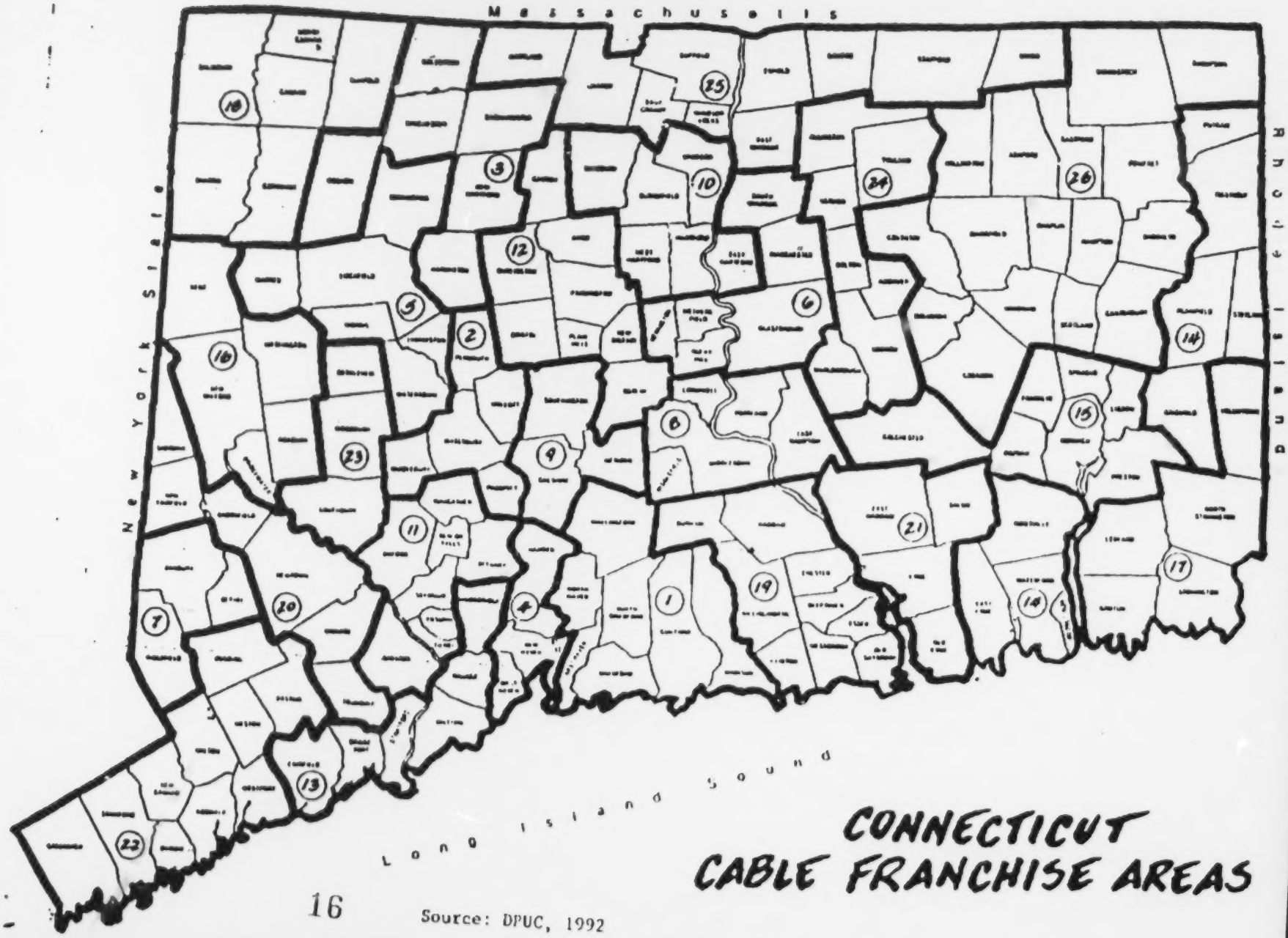
47 Lin Noble, "Middle School is First to Up-Link with Library," The New Britain Herald, 86, (April 11, 1995): 6.
48 Elisa Hutcoe, "TCI Offers Video Games on Interactive Channel," The New Britain Herald, 74, (March 28, 1995): 1,5.

Legend To Table A

Cable TV Company Name	Company Number
TCI Cablevision of South Central CT	1
Sammons Communications	2
Pegasus Cable Television	3
Storer Communications of Groton	4
Laurel Cablevision	5
Cox Cable of Greater Hartford	6
Comcast Cablevision of Danbury	7
Comcast Cablevision of Middletown	8
Telesystems of CT	9
TCI Cablevision of Hartford	10
Tele-Media of Western (Valley)	11
TCI Cablevision of Central CT	12
Cablevision of Southern Connecticut	13
Eastern Connecticut Cable Television	14
Century Norwich Corporation	15
Crown Cable New Milford	16
Storer Communications of Groton	17
TCI Cablevision of Northwestern CT	18
Storer Communications of Clinton	19
Crown Cable-Housatonic	20
Century Cable Management Corporation	21
Cablevision of Connecticut	22
Crown Cable Mid-CT	23
TCI Cablevision of Eastern Connecticut	24
Continental Cablevision	25
Tele-Media of Northeastern CT	26

Source: DPUC, 1993

TABLE A



CONNECTICUT
CABLE FRANCHISE AREAS

Source: DPUC, 1992

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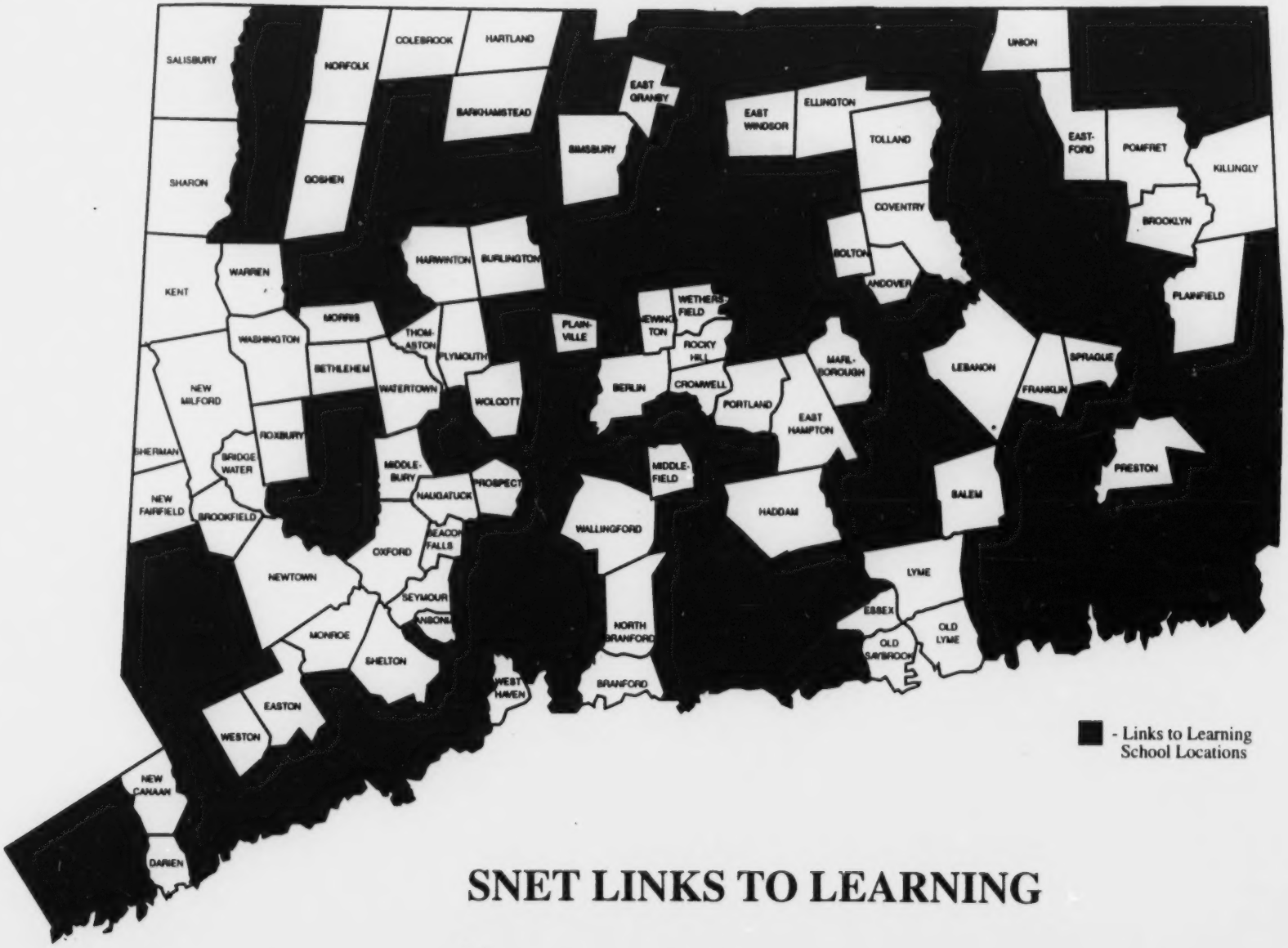
TABLE B



SNET LINKS TO LEARNING

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TABLE C

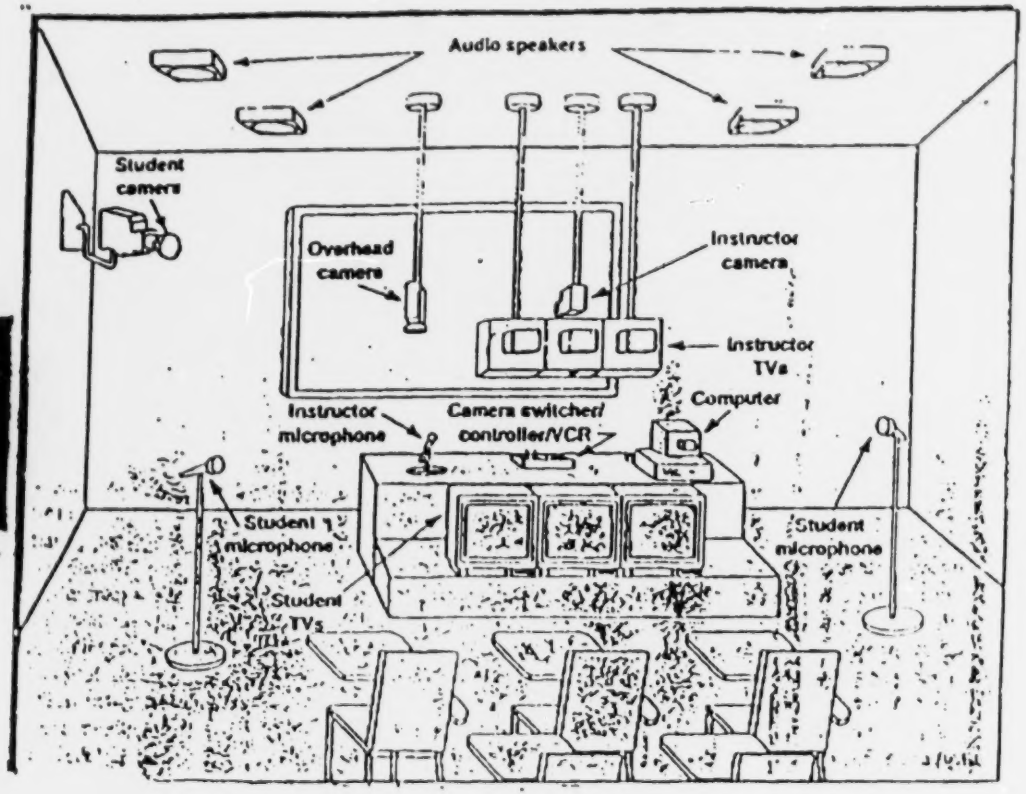
CABLE CLASSROOM EQUIPMENT COSTS
Four year acquisition plan for one site

Year 1- Minimum Receiving Site	5,375.
Year 2- Fully Equipped Receiving Site	4,425.
Year 3- Minimum Origination Site	4,890.
Year 4- Fully Equipped Origination Site	995.
	$15,685.

Cable company pays for:	
"Upstream" modulator	2,250.
Headend demodulator	2,300.
Programmable timer	700.
Switching matrix	400.
	$5,650.

Source: Middlesex Distance Learning Consortium, 1990

TABLE D



Source: Linking for Learning, Office of Technology Assessment, 1991.

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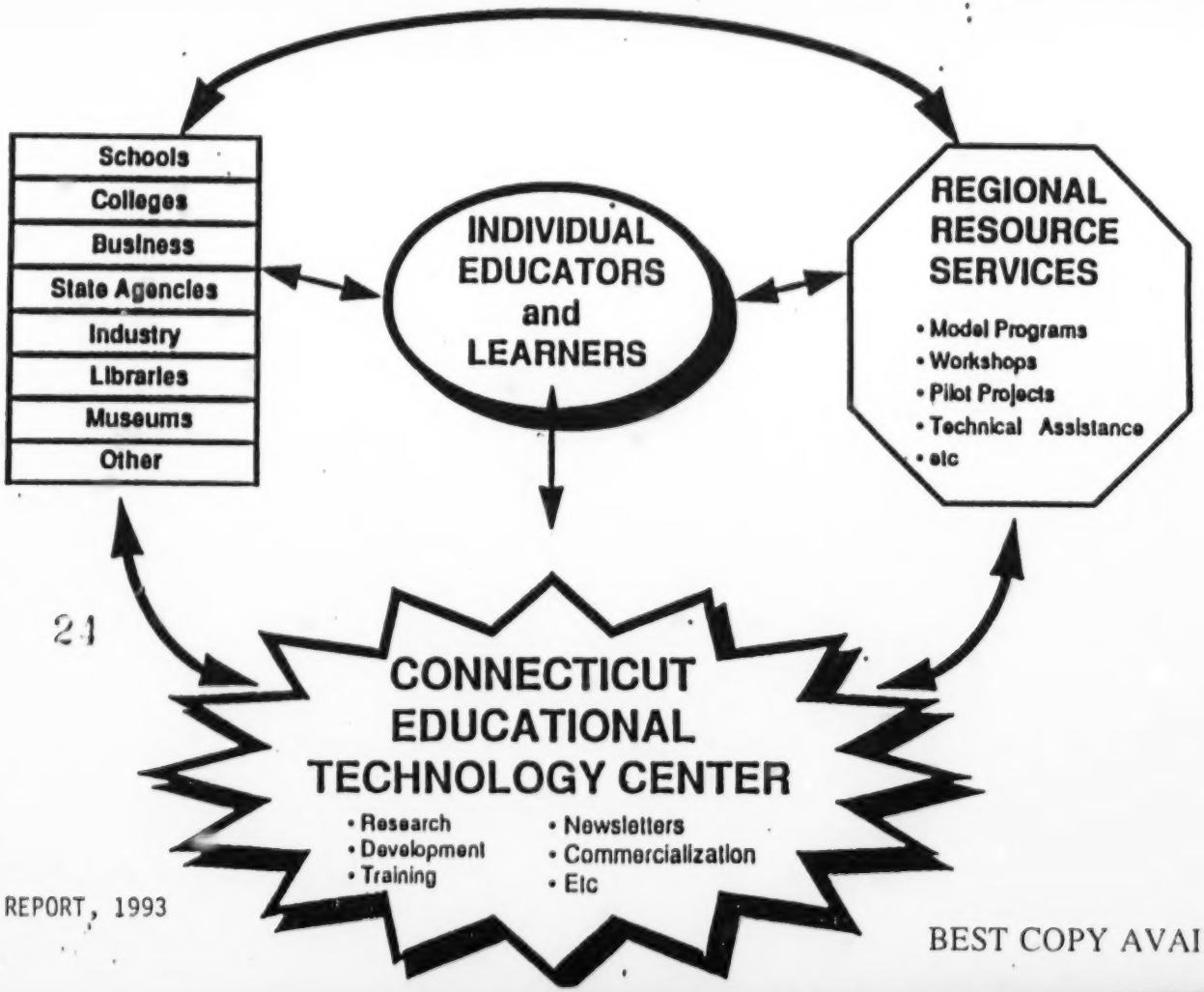
TABLE E

CONNECTICUT EDUCATIONAL TECHNOLOGY PROPOSED INFRASTRUCTURE



SOURCE: JCET ANNUAL REPORT, 1993

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